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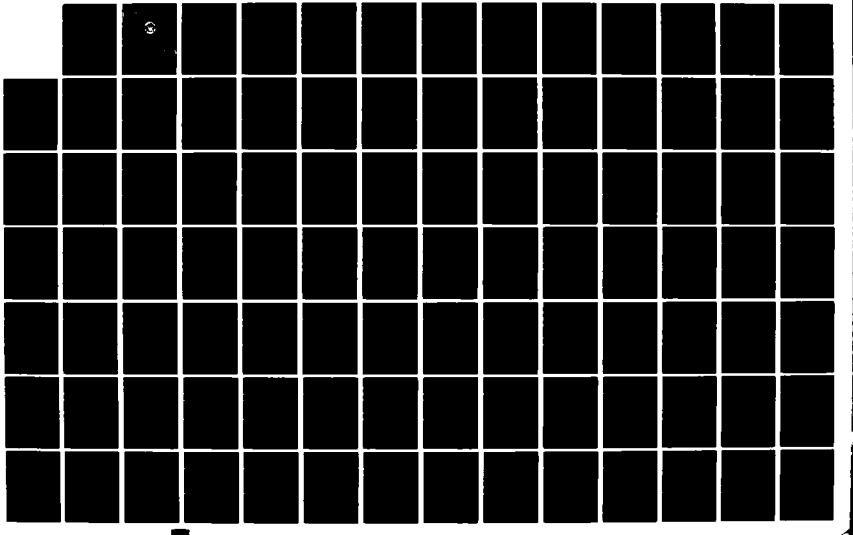

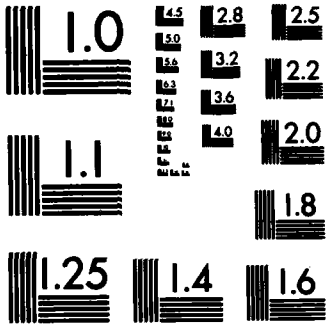

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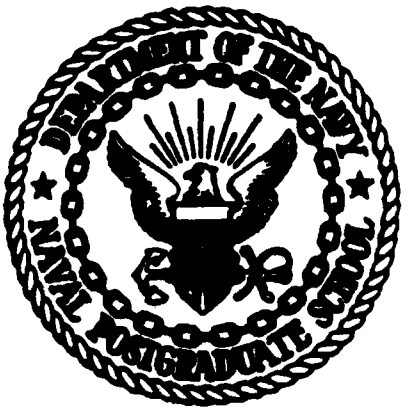

THESIS

A DECISION SUPPORT SYSTEM FOR
U.S. ARMY UNIT STATUS REPORTING

by

George F. Kolesar

June 1982

Thesis Advisor: Norman R. Lyons

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A122524	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) A Decision Support System for U.S. Army Unit Status Reporting		5. TYPE OF REPORT & PERIOD COVERED Master's Thesis June 1982
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) George F. Kolesar		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Postgraduate School Monterey, CA 93940		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Postgraduate School Monterey, CA 93940		12. REPORT DATE June 1982
		13. NUMBER OF PAGES 136
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report)
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release, distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

decision support system
unit status report
readiness
combat readiness
dss

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

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An alternate method is presented that uses a Decision Support System to assist the unit commander to accurately and

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S/N 0102-014-6601

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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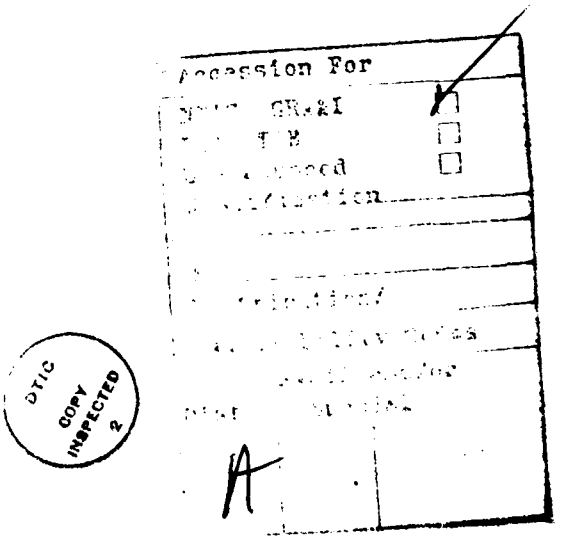

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A Decision Support System for U.S. Army Unit Status Reporting

by

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Major, United States Army
B.S., United States Military Academy, 1967

Submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN COMPUTER SCIENCE

from the

NAVAL POSTGRADUATE SCHOOL
June 1982

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ABSTRACT

The Unit Status Report is the method employed by US Army units to report their combat readiness to the Department of the Army and the Joint Chiefs of Staff. This critically important information is currently acquired, processed and transmitted using manual methods that do not take advantage of the latest developments in computer technology.

An alternate method is presented that uses a Decision Support System to assist the unit commander to accurately and efficiently process his data and determine the correct combat readiness rating to report.

The paper includes a general description of Decision Support Systems and the specific design, including a computer program written in Pascal, of a Decision Support System to improve the reporting method.

TABLE OF CONTENTS

I. INTRODUCTION

Designated Army units submit status reports on a recurring basis, in accordance with the provisions of Army Regulation (AR) 220-1, Unit Status Reporting, to National Command Authorities (NCA), the Joint Chiefs of Staff (JCS), the Department of the Army (DA), and commanders at all intermediate levels. The JCS uses the information from the reports for worldwide operational planning and as a source to determine force availability. The DA uses the information to (1) identify factors which degrade unit status, (2) assist the DA and intermediate commands to allocate resources, (3) identify the differences between current personnel and equipment assets in units and full wartime requirements, and (4) determine Army-wide readiness conditions and trends. [Ref. 1]

Obviously, this information is critically important to the JCS and the DA. You would expect that the information would be acquired, processed and transmitted using the most modern methods available and that commanders at each level in the chain-of-command, who are responsible for the timeliness and accuracy of this information, would be

assisted by efficient and effective management information systems (MIS).

Unfortunately, in neither case is the Army meeting those expectations. This paper proposes that the use of a Decision Support System (DSS) will greatly improve Unit Status Reporting. Chapter II describes the method currently used within the Army for Unit Status Reporting. In Chapter III, a general discussion of the DSS concept is presented, outlining the evolution of DSS from previous information concepts. Chapter IV provides a description of a specific DSS to assist the Army commander in Unit Status Reporting. Chapter V explains how the proposed DSS could eventually be tied-in to other, already existing, databases and automated reports to further improve the general information reporting effort. Chapter VI summarizes the application of a DSS to Unit Status Reporting and explains what additional steps are necessary to enable the DSS to assist all commanders, regardless of type of unit or geographic location. Appendix A contains sample dialogues of battalion commanders using the DSS at terminal sessions. Appendix B contains copies of the Unit Status Reports that are produced from the sessions of Appendix A. Finally, Appendix C is a Pascal-source program for the specific DSS proposed in Chapter IV.

II. CURRENT METHOD

The DA requires battalions, separate companies and designated detachments which are organic (assigned) to a division, separate brigade or regiment to report the status of their personnel, equipment and training. Reports are submitted each month or whenever a significant change in the unit's status occurs.

The reports are forwarded through each intermediate level in the chain of command until they reach the DA. Commanders at levels above the reporting unit level are not permitted to change the ratings of subordinate units, but they are able to provide comments on the reports to the DA.

Although many different units, including such diverse types as artillery, medical, intelligence and atomic demolition, currently submit status reports, the mechanics of completing the report are essentially the same, regardless of the type of unit. I have chosen the infantry battalion, probably the most common unit reporting its status, to demonstrate both the current method of reporting and the recommended alternate method.

For each report, the battalion commander, through his subordinates, gathers statistics about the personnel and equipment in his command. The numbers and types of personnel and equipment he is permitted to requisition are stated in a document known as the Modified Table of Organization and Equipment (MTOE). Every active Army unit has an MTOE to describe its configuration. The MTOE indicates two requisition levels that (1) prescribe the quantity of personnel and equipment to meet the unit's wartime mission (known as "required" or "full" level); and (2) prescribe the quantity of personnel and equipment the unit is currently authorized to maintain for its peacetime mission (known as "authorized" level).

The authorized level is specified as an Authorized Level of Organization (ALO) which generally corresponds to a percentage of the required level. The vast majority of units are organized as either ALO 1 (100 percent), ALO 2 (90 percent), ALO 3 (80 percent), or ALO 4 (70 percent). This means, for example, that a battalion which has a required level of 100 5-ton trucks and is organized as ALO 2, would be authorized to requisition and maintain 90 5-ton trucks (90 percent of the required level).

If the DA determines that the unit must be brought up to its full wartime capability, it will direct the battalion to

an ALO 1 level and the battalion will requisition the additional personnel and equipment needed to meet the required level. Very few Army units are routinely maintained at ALO 1.

Using the MTOE as his reference, the battalion commander computes various indicators of his unit's status and reports them up through his chain of command.

A. REPORTING PROCEDURE

The reporting procedure consists of a series of computations concerning the status of the battalion's personnel and equipment and a subjective judgement on the part of the commander on the unit's training status. Finally, the data is compared and analyzed to determine the unit's overall rating, which normally ranges from 1 (the best) to 4 (the worst). More will be said about the overall rating later. All data is entered in designated blocks of DA Form 2715, Unit Status Report Worksheet (Figures 1 and 2). Section A (Figure 1) contains data that is of interest to Army managers and is transmitted no higher than the DA. Section B (Figure 2) contains data that is sent through the DA to the JCS.

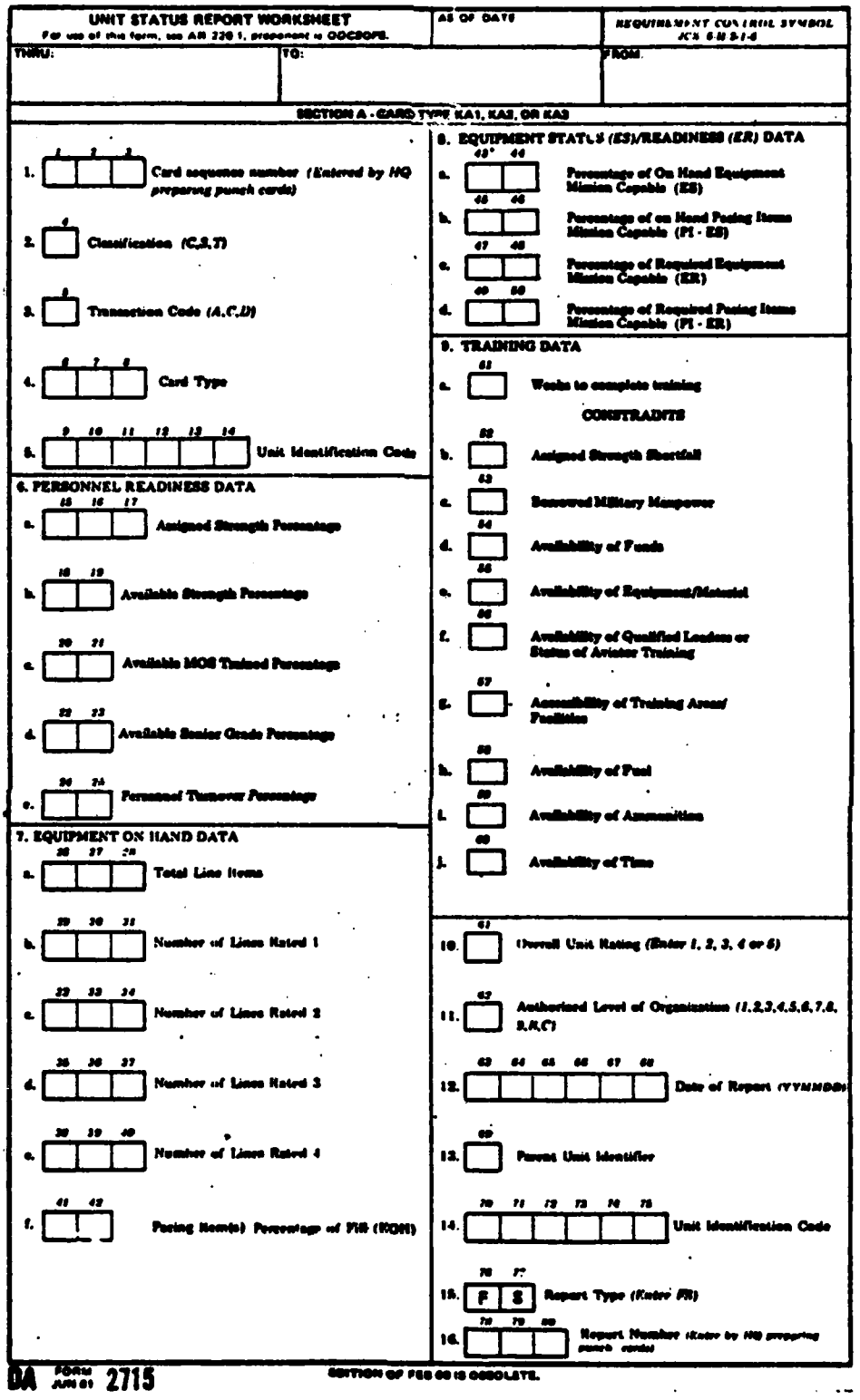

Figure 1. Section A, Unit Status Report Worksheet

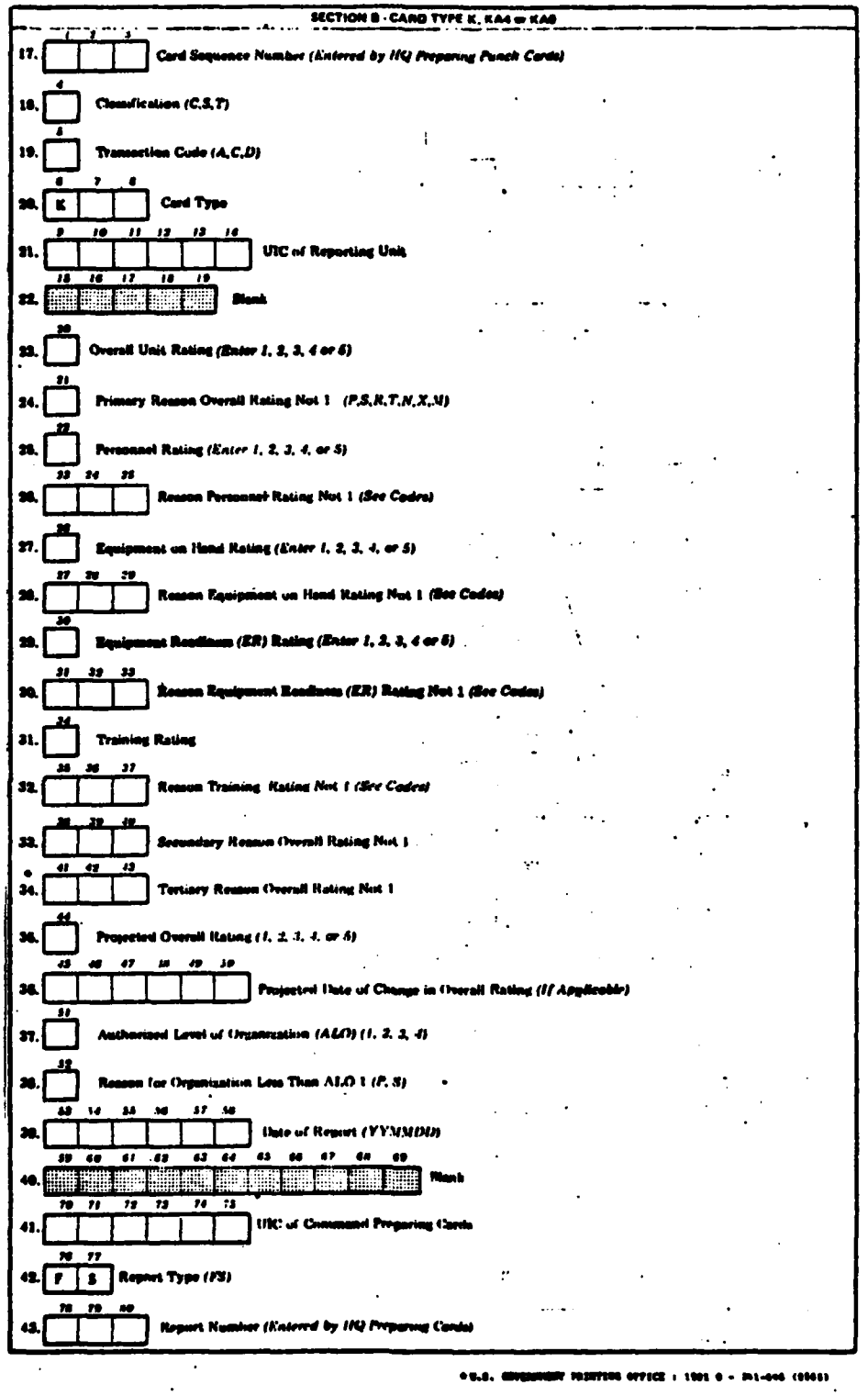

Figure 2. Section B, Unit Status Report Worksheet

1. Personnel Readiness Data

The personnel readiness data consists of five computerized percentages.

a. The ASSIGNED STRENGTH PERCENTAGE is determined by dividing the assigned strength by the required MTOE strength and converting to a percentage. The assigned strength is the actual number of personnel assigned to the battalion on the day for which the report is prepared. Ideally, the assigned strength approximates the authorized strength, but, through the influence of Army-wide factors (e.g. recruitment, retention, funding constraints) the assigned strength may exceed the required strength or fall far short of the authorized strength.

EXAMPLE:

Assigned strength / Required MTOE strength x 100 =
682 / 776 x 100 = 87.8%
round off to 88% and enter 088
in blocks 15, 16, 17, section A of the form.

b. The AVAILABLE STRENGTH PERCENTAGE is determined by dividing the available strength by the required MTOE strength and converting to a percentage. The available

strength is computed by taking the assigned strength and subtracting the number of personnel who are in such categories as missing in action, pending legal action, absent without leave (AWOL), hospitalized, on leave, under commander's restriction or pregnant. Appendix B, AR 220-1 contains complete instructions.

EXAMPLE:

Available strength / Required MTOE strength x 100 =
622 / 776 x 100 = 80.2%
round off to 80% and enter 80
in blocks 18, 19, section A of the form.

c. The AVAILABLE MOS TRAINED PERCENTAGE is determined by dividing the available MOS trained strength by the required MTOE strength and converting to a percentage. "MOS" is an abbreviation for Military Occupation Specialty and is a code that designates a soldier's specialty (e.g. infantryman) and his level of specialty development (on a scale from 1 to 5). Each personnel authorization in the MTOE specifies an MOS and grade (rank) to fill that position. For example, the battalion may be authorized 200 riflemen, 11B10. The "11B" signifies an infantryman, while

the "10" signifies development level 1 (the "0" is a filler). To compute the available MOS trained strength, the commander determines the number of personnel included in the available strength who match the MOS requirements of the MTOE and are trained in their jobs. He does not count overstrengths in a specific skill or soliiers who are AWOL or in confinement. Obviously, the available MOS trained strength can not exceed the available strength.

EXAMPLE:

Available MOS trained strength / Required MTOE
strength x 100 =
583 / 776 x 100 = 75.1%
round off to 75% and enter 75
in blocks 20, 21, section A of the form.

d. The AVAILABLE SENIOR GRADE PERCENTAGE is determined by dividing the available senior grade strength by the required MTOE senior grade strength and converting to a percentage. "Senior grade" is defined to be all officers, all warrant officers and enlisted personnel in pay grades E5 through E9.

EXAMPLE:

Available senior grade strength / Required MTOE senior grade strength x 100 =

183 / 200 x 100 = 91.5%

round off to 92% and enter 92

in blocks 22, 23, section A of the form.

c. The PERSONNEL TURNOVER PERCENTAGE is determined by dividing the number of personnel reassigned or discharged ("turned over") from the battalion during the previous three months by the ASSIGNED STRENGTH of the battalion (on report "as of" date) and converting to a percentage. It is important to note that the divisor for this computation is the assigned strength, rather than the required MTOE strength.

EXAMPLE:

Personnel turned over / Assigned strength x 100 =

103 / 682 x 100 = 15.1%

round off to 15% and enter 15

in blocks 24, 25, section A of the form.

f. To determine the personnel rating, the commander compares the computed percentages with rating tables provided in AR 220-1. The available strength percentage is compared to Table 1, while the available MOS trained percentage and the available senior grade percentage are compared to Table 2. Neither the assigned strength percentage nor the personnel turnover percentage is used to determine the personnel rating. They are provided only for information.

TABLE 1

Available Strength	Rating
90% or greater	1
80% to 89%	2
70% to 79%	3
Below 70%	4

TABLE 2

Available MOS or Senior Grade Strengths	Rating
85% or greater	1
75% to 84%	2
65% to 74%	3
Below 65%	4

From our previous examples:

80% available strength yields a rating of 2.

75% available MOS trained strength yields a rating of 2.

92% available senior grade strength yields a rating of 1.

The available strength rating and the available MOS strength rating have tied as the highest (worst) of the three ratings determined. Therefore, the battalion commander would report a personnel rating of 2 and enter this number in block 22, section B of the form. If the personnel rating is not 1, as in this case, the commander enters a 3-character code in blocks 23, 24, 25, section B from Appendix E, AR 220-1, which cites the most significant factor preventing a higher rating. In this case, code P03 (MOS imbalances) would likely be entered.

2. Equipment Readiness Data

The equipment readiness data is divided into two sections, equipment-on-hand data and equipment status/readiness data. A separate rating is determined for each section.

a. Equipment-On-Hand Data

Equipment-on-hand data is determined by consulting the equipment section of the MTOE. Each distinct piece of equipment is identified by a line item number (LIN), a type of stock number, and an Equipment Requirements Code (ERC), which identifies the relative importance of the equipment (A for primary, B for secondary, C for nonessential). The commander determines the number of LINs that have a number of 1, or greater, in the Required Column of the MTOE and are coded ERC-A. (The DA has identified certain LINs that are not to be reported and these are listed in the regulation.) The number of reportable LINs is entered in blocks 26, 27, 28, section A of the form.

Each reportable LIN is then rated by comparing the number of each LIN that is on hand to the number in the MTOE Required Column. For LINs where 21 or more are indicated in the Required Column for that LIN, divide the number of items on hand by the number required and convert to a percent. The rating for LINs with 21 or more items is determined from Table 3.

TABLE 3

LIN fill	Rating
90% or greater	1
80% to 89%	2
65% to 79%	3
Below 65%	4

The rating for LINs with 20 or less items is determined by consulting a rather large, but easy to read, table in AR 220-1. Because of its size, I have not shown it here. Detailed instructions for special equipment (e.g. aircraft and missiles) are also listed in this section of the regulation.

After all LINs have been rated, the commander enters the number of LINs rated 1 in blocks 29, 30, 31 (with leading zeros, if necessary); the number of LINs rated 2 in blocks 32, 33, 34; the number of LINs rated 3 in blocks 35, 36, 37; and the number of LINs rated 4 in blocks 38, 39, 40, section A of the form.

Major weapons systems, aircraft, and major items of equipment that are central to an organization's capability to perform its designed MTOE mission are known as Pacing

Items. All combat units and nearly all support units have designated Pacing Items. These items are subject to continuous monitoring and management at all levels of command and are reported separately in both sections of the equipment readiness data.

The Pacing Items for an infantry battalion are the DRAGON and TOW anti-tank weapons. The percentage of fill for each is determined by dividing the number of weapons on hand by the number in the MTOE Required Column. Each weapon is then rated by consulting Table 3, above. The percentage of fill of the Pacing Item with the worse (highest) rating is then entered in blocks 41, 42, section A of the form.

To determine the equipment-on-hand rating, the commander computes 90 percent of the number of LINs entered in blocks 26, 27, 28, section A. He then compares this number to the number of LINs rated 1. If the 90-percent number is less than or equal to the number of LINs rated 1, the "interim" equipment-on-hand rating is 1; otherwise, he adds the number of LINs rated 1 and the number of LINs rated 2. If the 90-percent number is less than or equal to the rated 1/rated 2 sum, the "interim" equipment-on-hand rating is 2; otherwise, the LINs rated 3 total is added, and so on. The commander keeps adding groupings of rated LINs until he exceeds the 90-percent number. The rating of the last grouping added is the "interim" equipment-on-hand rating. I

have called this rating "interim" because one additional check is required. The equipment-on-hand rating can not be better (smaller) than the rating determined for the Pacing Items. The worse (higher) rating is used.

EXAMPLE 1:

Total LINs	080
Number of LINs Rated 1	070
Number of LINs Rated 2	003
Number of LINs Rated 3	006
Number of LINs Rated 4	001
Pacing Item Percentage of Fill	78

90% of Total LIN = 72

72 greater than 70 (LINs Rated 1)

add LINs Rated 2 (70 + 3 = 73)

72 less than 73

"interim" rating is 2 (Rated 2 grouping last added)

Pacing Item rating is 3 (from Table 3)

Pacing Item rating "worse" than "interim" rating

Equipment-on-hand rating is 3

EXAMPLE 2:

Total LINs	080
Number of LINs Rated 1	070
Number of LINs Rated 2	001
Number of LINs Rated 3	005
Number of LINs Rated 4	004
Pacing Item percentage of fill	95

90% of Total LINs = 72

72 greater than 70 (LINs Rated 1)

add LINs Rated 2 (70 + 1 = 71)

72 greater than 71 (LINs Rated1/Rated 2)

add LINs Rated 3 (71 + 5 = 76)

72 less than 76

"interim" rating is 3 (Rated 3 grouping last added)

Pacing Item rating is 1 (from Table 3)

Pacing Item rating "better" than "interim" rating

Equipment-on-hand rating is 3

Using Example 1, the battalion commander would report an equipment-on-hand rating of 3 and enter this number in block 26, section B of the form. Since the rating

is not 1, he must select a code from Appendix E of the regulation, as he did for the personnel rating, and enter it in blocks 27, 28, 29, section B. S90 (shortage-pacing items) would be appropriate for the example used.

b. Equipment Status/Readiness data

EQUIPMENT STATUS is the mission capable rate of ERC-A reportable equipment which is actually on hand. The rate is reported as a percentage and is computed for the 30-day period prior to the reporting date. Data for computation comes from three possible sources. Data for aircraft is taken from DA Form 1352 (Army Aircraft Inventory Status and Flying Time); data for missiles is taken from DA Form 3266-1 (Missile Materiel Readiness Report); and data for all other reportable equipment is taken from DA Form 2406 (Materiel Readiness Report). Each of these reports is maintained by the maintenance section of the unit and, among other data, indicates the number of days in the period that the equipment was operational and available to support the unit's mission.

Since his unit has no aircraft, the battalion commander is concerned with only two of the forms. The data for his TOW and DRAGON anti-tank weapons is listed on DA Form 3266-1, while the data on all other reportable equipment is on DA Form 2406. (The items of equipment to be reported on DA Form 2406 are determined by a totally

different directive (Technical Manual 38-750) which requires data on significant maintainable equipment, such as trucks, generators, radios, etc., to be collected. Only a portion of the ERC-A items is reported on the DA Form 2406.) He determines the Percentage of On Hand Equipment Mission Capable (ES) by identifying only those items of equipment on the two maintenance forms which have been previously reported in the Total Line Items portion (blocks 26, 27, 28) of the Equipment-On-Hand Data section and divides the total number of days the equipment was actually available by the total number of days the equipment could possibly have been available.

EXAMPLE:

Equipment	On Hand	Available Days	Possible Days (On Hand x 30)
DRAGON	24	564	720
TOW	23	576	690
Generator, 5 KW	10	197	300
Radios	122	3001	3660
Trucks	88	2365	2640
	TOTAL	6803	8010

ES% = Available days / Possible days x 100 =

6803 / 8010 x 100 = 84.9%

round off to 85% and enter 85

in blocks 43, 44, section A of the form.

The commander must also determine the Percentage of On Hand Pacing Items Mission Capable (PI-ES). To do this, he uses the data pertaining only to the Pacing Items and, since he has two of them, reports the worse case. From the example above:

DRAGON	664 / 720 x 100 = 92.2%
TOW	576 / 690 x 100 = 83.5%

The commander should round the TOW's rating to 84% and enter 84 in blocks 45, 46, section A of the form.

EQUIPMENT READINESS is the amount of mission capable ERC-A equipment on hand in a unit compared to that amount specified in the <u>required</u> column of the MTOE. The same instructions, as listed above, apply when determining the equipment to be reported and where to obtain mission capable data.

The commander determines the Percentage of Required Equipment Mission Capable (ER) by dividing the number of days the on-hand equipment was available by the number of days the required amount of equipment would have been available (required amount x 30). Taking the previous example and adding data for the required amounts, we have:

EXAMPLE:

Equipment	Req	O/H	AD	PD	RD
DRAGON	24	24	664	720	720
TOW	24	23	576	690	720
Generator, 5KW	12	10	197	300	360
Radios	175	122	3001	3660	5250
Trucks	109	88	2365	2640	3270
		TOTAL	6803	8010	10320

where: Req = Required column of MTOE

O/H = Amount on hand in unit

AD = Available days

PD = Possible days (O/H x 30)

RD = Required days (Req x 30)

ER% = Available Days / Required Days x 100 =

6803 / 10320 x 100 = 65.9%

round off to 66% and enter 66

in blocks 47, 48, section A of the form.

As he did before, the commander must also determine the Percentage of Required Pacing Items Mission Capable (PI-ER). He does this by dividing the number of days each Pacing Item was available by the number of days the required amount of Pacing Items would have been available. He reports the Pacing Item with the worse (lower) result. From the previous example:

DRAGON	664 / 720 x 100 = 92.2%
TOW	576 / 720 x 100 = 80.0%

The commander should use the TOW's rating and enter 80 in blocks 49, 50, section A of the form.

The equipment status data (ES and PI-ES) are provided only for information. The equipment readiness rating is determined from the equipment readiness data (ER and PI-ER). To find the rating, the commander consults Table 4 for both ER and PI-ER and reports the worse (higher) rating.

TABLE 4

Percentage Mission Capable	Rating
90% or greater	1
70% to 89%	2
60% to 69%	3
Below 60%	4

From our example:

ER of 66% yields a rating of 3.

PI-ER of 80% yields a rating of 2.

The commander would report an equipment readiness rating of 3 and enter this number in block 30, section B of the form. Since the rating is not 1, he must select a code from Appendix E of the regulation, as he has done previously, and enter it in blocks 31, 32, 33, section B. Since the generators had the least availability (an average of 16.4 days), an appropriate code would be R23 (damaged/inoperative-generators).

3. Training Data

The primary purpose of the unit training rating is to show the current capability of the unit to perform the functions, tasks, or missions for which organized and designed (the full MTOE mission).

A secondary purpose is to show any resource shortfall which prevents the unit from maintaining a training program necessary to achieve training objectives.

The commander evaluates the proficiency of the unit during its training exercises to determine the training rating. However, unlike the previous evaluation areas, no exact process exists to determine the training rating and the determination is mostly subjective. Both performance displayed during training and the elapsed time since that training was completed are major factors which the commander must consider.

The training rating is calculated based on an estimate of the time needed to overcome training shortfalls. This estimate is made considering only the personnel and equipment assigned to the unit. The commander does not assume that existing personnel and equipment shortages will be filled before training starts.

Only one factor, the number of weeks to complete training, ultimately is used to determine the training rating. In estimating the number of weeks, the commander

can look to some of the data previously calculated such as available MOS trained percentage (blocks 20, 21); available senior grade (leadership) percentage (blocks 22, 23); and personnel turnover percentage (blocks 24, 25). He also is required to estimate the degree that resource constraints are preventing the unit from maintaining the desired training program and enter his estimates in blocks 52 through 60 of section A of the form. For each resource constraint listed below, he enters "A" if the factor has an insignificant impact on training, "B" if the factor has a minor impact, "C" if the factor has a major impact, or, "D" if the factor prohibits satisfactory training.

a. Assigned Strength Shortfall (block 52). Enter the effect personnel shortages may have had an training.

b. Borrowed Military Manpower (BMM) (block 53). Enter the effect caused by the lending of unit personnel to organizations outside the battalion (e.g. vacant civilian or military positions at Post Headquarters).

c. Availability of Funds (block 54). Enter the effect caused by lack of funds for unforeseen training expenses or planned training for which budgeted funds have been reduced.

d. Availability of Equipment/Materiel (block 55). This category is not limited to MTOE equipment. Consider availability of training items such as mock-ups, simulators and training films.

e. Availability of Qualified Leaders or Status of Aviator Training (block 56). Consider those leaders most needed for training in the unit's MTOE mission (e.g. company commanders, platoon leaders, squad leaders).

f. Accessibility of Training Areas/Facilities (block 57). Consider quality, size and accessibility of training areas reasonably available to the unit.

g. Availability of Fuel (block 58). Consider fuel needed for both field and garrison training.

h. Availability of Ammunition (block 59). Consider both service and training-peculiar ammunition.

i. Availability of Time (block 60). Consider the impact of competing activities which detract from training time so much that they reduce training readiness.

After he has taken into account his observations of the unit, any relevant data and the impact of resource constraints, the commander determines the number of weeks he feels are necessary for the unit to become fully trained for its MTOE mission and enters the number in block 51, section A of the form. If he feels that more than 9 weeks are necessary, he enters "E". If he feels the unit will never be ready, he enters "X".

The training rating is determined by comparing the number of weeks to complete training with Table 5.

TABLE 5

Weeks	Rating
0 to 2	1
3 to 4	2
5 to 6	3
more than 6, X or E	4

Continuing our example, assume the commander has determined it would take 4 weeks to complete the necessary training to make the unit combat ready. His training rating is a 2 and he enters this in block 34, section B of the form. Once again, since the rating is not 1, he selects the code from Appendix E of the regulation that best explains why, and enters it in blocks 35, 36, 37, section B. Since he has problems with getting operational equipment, he might select T31 (shortage-equipment) as an appropriate code.

4. Overall Unit Rating

The commander has completed his evaluation of his unit in the areas of personnel, equipment and training. Based on these evaluations, he must now determine an overall rating for his unit. The possible overall ratings are:

1. (combat ready, no deficiencies)---The unit has its prescribed levels of wartime resources and is trained so that it is capable of being deployed.

2. (combat ready, minor deficiencies)---The unit has only minor deficiencies in its prescribed levels of wartime resources or training. Its capability to perform the wartime mission for which it is organized is limited. The unit is capable of being deployed, but minor additional training or resources are desirable.

3. (combat ready, major deficiencies)---The unit has major deficiencies in its prescribed levels of wartime resources or training. Its capability to perform the wartime mission for which it is organized is limited. It can deploy or execute its operational contingency mission at reduced capability, but normally it must first be given additional training or resources to increase its readiness posture.

4. (not combat ready)---The unit has major deficiencies in prescribed wartime resources or training and can not effectively perform the wartime mission for which it is organized. It requires major upgrading prior to deployment or employment in combat. However, if conditions dictate, the unit might be deployed or employed for whatever residual capability it does have.

5. (not combat ready, programmed)---Due to HQDA action or programs, the unit is not ready and does not have the prescribed wartime resources or can not perform the wartime mission for which it is organized. Rating-4 deployment and employment considerations apply. Units rated 5 are restricted to the following:

a. Units undergoing reorganization or major equipment conversion or transition.
b. Units placed in cadre status.
c. Units which are being activated or inactivated.
d. Units which are not manned or equipped but are required in the wartime force structure.
e. Units with primary tasking as training units that could be tasked to perform a wartime mission.

The commander must decide which of the ratings listed above best describes the current status of his unit. In making his decision, he must consider the ratings in the areas of personnel, training, and equipment, and shortcomings or capabilities not shown in the ratings. He must also consider the availability of his major equipment systems and the availability of spare parts for those systems. Normally, the overall rating will not be better than the training rating since it includes both training proficiency with current assets and sustainability compared to full wartime requirements.

As a general rule, the commander selects the worse rating from the personnel, equipment and training areas as his overall unit rating. He will find that the rating descriptions above will usually support his choice. From our example:

The personnel rating is 2.
The equipment-on-hand rating is 3.
The equipment readiness rating is 3.
The training rating is 2.

Based on these ratings, the commander should select an overall unit rating of 3 and enter it in block 61, section A

AND block 20, section B of the form. Once again, since the rating is not 1, the commander must explain. However, in this case, he explains THREE times. In block 21, section B, he lists the primary reason. He can choose P (personnel), S (equipment-on-hand), R (equipment readiness) or T (training). There are two other possible choices, N or X, which will be discussed later. However, for our example, the commander would probably choose R because of the problems caused by his inoperative radios and generators. He also is required to give a secondary reason (blocks 38, 39, 40) and a tertiary reason (blocks 41, 42, 43) that the overall rating is less than 1. He gets these codes from Appendix E of the regulation. Either of these codes may be from the same resource area as the primary reason, but it must be a different code. The commander had a shortage of pacing items in the equipment-on-hand area, so S90 (shortage-pacing items) should be entered as the secondary reason. He could then highlight his problem with inoperative radios by entering R22 (inoperative-communication equipment) or his low available MOS trained strength by entering P03 (MOS imbalances). The choice is his.

Next the commander enters his unit's Authorized Level of Organization (ALO) in block 62, section A and block 51, section B of the form. He does this for a very

important reason. As was stated in an earlier paragraph, the ALO is listed in the MTOE and assigned to the unit by the DA. It permits the unit to maintain a portion of the full (ALO 1) authorization. If a unit is only authorized ALO 2, it should be impossible, unless it is overstrength, for the unit to attain an overall rating higher than 2. The DA expects a unit, under the best conditions, to attain an overall rating equal to its ALO. So, going back to the reasons (block 21, section B) why a unit failed to reach an overall rating of 1, we must add one more choice: N (unit ALO does not permit a higher rating).

Finally, the commander has one more option he can exercise. Regardless of how the area ratings and number come out, he may feel that the unit should have a particular rating. For example, a tank unit commander may have all of his tanks, all of his people and his unit is well trained. His "numbers" may result in an overall rating of 2. Currently, however, none of the radios in the tanks are operational. The tank crews can not communicate with each other and the combat effectiveness of the unit is severely impaired. Because of this, the commander decides to rate his unit as a 3 (combat ready, major deficiency). He does so by entering a 3 in block 61, section A and block 20, section B. He also enters an "X" in block 21, section B. The "X" signifies that the commander is making a subjective

change to the overall rating. He is required to justify his action with a short explanation on a Remark Card (explained later), but his judgement will not be challenged. He is the commander and the most qualified to evaluate the unit. Likewise, if his unit's overall rating computes to a 4, he could subjectively raise the rating. The rating of 4 could be due to equipment shortages, but the commander might feel that the missing equipment is not essential to his unit's combat mission. Once again, he will have to explain his action on a Remark Card.

The point to be made here is that an objective process exists to determine the unit's overall rating, but the commander is not bound to that rating. If he has a good reason to do so, he can report a better or worse overall rating. He is the decision maker.

The commander's final responsibility is to prepare comments about his report. For this he uses DA Form 2715-1 (Unit Status Report Worksheet-Section C-Remarks) (Figure 3). He must complete Part I of the form if either the overall rating is less than the unit ALO, or if the overall unit rating differs from the lowest rating of the resource areas (subjective change). Both conditions may exist simultaneously. He completes Part II of the form if any of the following areas would result in a rating below ALO:

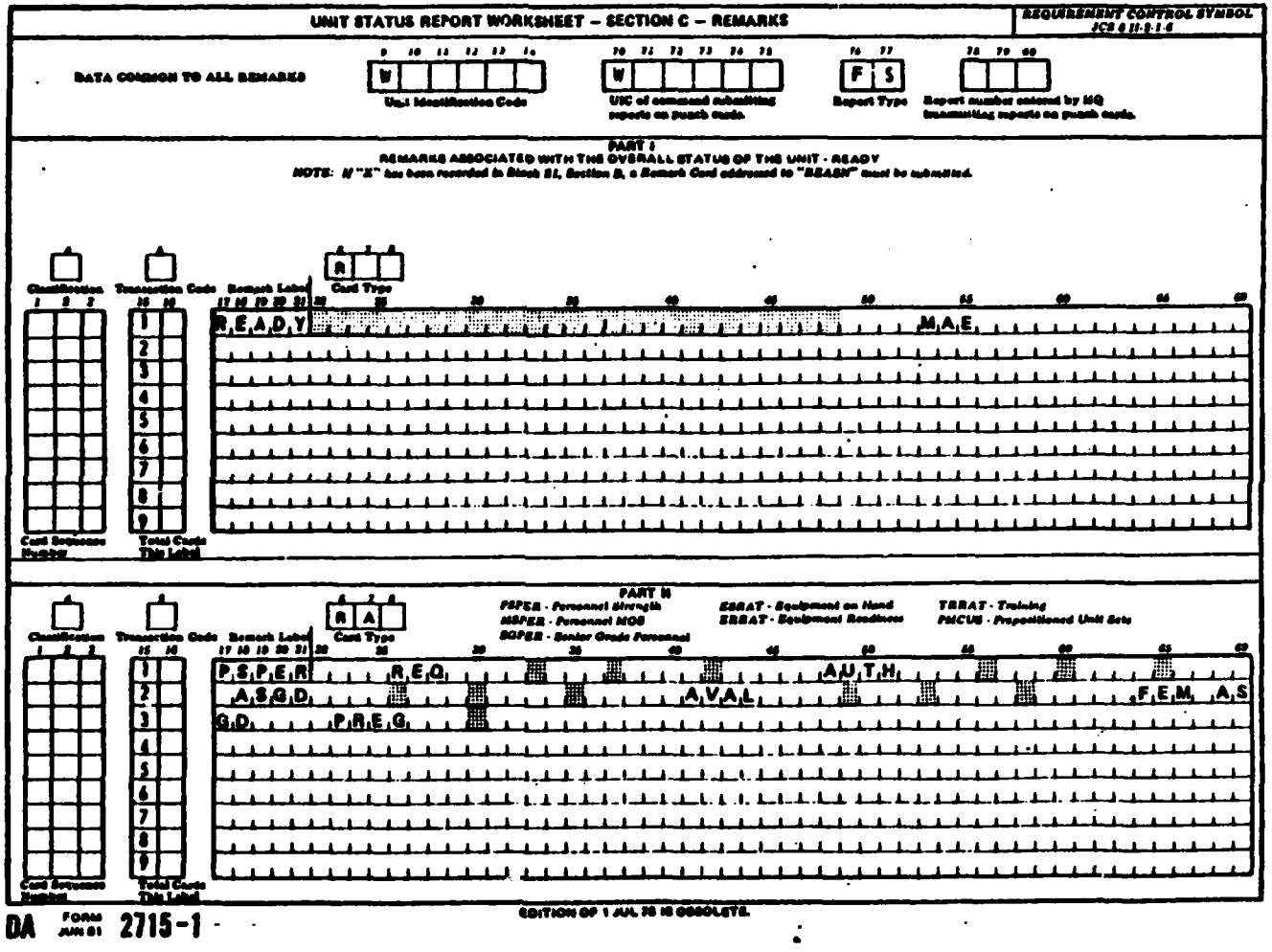

Figure 3, Section C, Unit Status Report Worksheet

MOS shortages

senior grade shortages

equipment-on-hand shortages

equipment readiness

training

Additionally, he must make a mandatory remark, regardless of the rating, about the unit's personnel strength. A portion of Part II is overprinted (PSPER) for this purpose.

The details for filling out the form are explicitly described in the regulation and are not reproduced here. What is important to note is that some comments are required to be submitted as part of the report.

There are some blocks on the forms that are still blank. They are used for administrative processing of the report and are not of interest in understanding the Unit Status Report reporting process. Essentially, the report is now complete and ready for transmission.

B. UNIT STATUS REPORT TRANSMISSION

After completing the Unit Status Report Worksheets, the commander sends the forms, normally hand-carried by his representative, to a group formed by the senior commander (e.g. Division Commander). The battalion commander's computations are verified and his data and comments are

copied for the senior commander's report (a composite of all subordinate units). If any question arises as to the accuracy of data or correctness of comments, the group sends the worksheets back to the battalion commander for rectification. Once the senior commander's group is satisfied that the report is accurate in both detail and format, it causes the data and remarks on the worksheets to be transcribed to 80-column punchcards in accordance with a format and sequence specified in the regulation.

The card deck is used to prepare a printed version of the Unit Status Report for the reporting unit and the senior commander. The card deck is then transmitted via AUTODIN to the DA, which deletes the Army-only information and forwards the remainder to the JCS.

C. PROBLEMS WITH THE CURRENT METHOD

1. Manual System

The biggest problem with the current reporting method is that it is a pencil and paper drill. As can be seen from my description of the process (which I severely condensed from the regulation), the commander must slowly proceed through the regulation, which contains 67 pages of instructions and definitions, insuring that each step has been followed. This tedious process invites mistakes because of the sheer volume of instructions that must be considered.

2. Complicated

The current method is unduly complicated because of the numbers of authorization documents, reports, tables, and factors that must be consulted and considered if the computations are to be done accurately. At a minimum, a commander must obtain data from his MTOE, Unit Property Book, Materiel Readiness Report, Missile Materiel Readiness Report, various training reports and all of the rating tables of AR 220-1. He must also perform several computations, insuring that he has selected the proper factor (e.g. required MTOE strength or assigned strength as a divisor) each time to apply to the formula. He must also perform several comparisons of figures to choose the proper determinant of the rating. All of these documents and numbers invite mistakes in reference, transposition and calculation.

Although I have described the commander as the preparer of the report, in reality he delegates the responsibility to a subordinate. Neither the subordinate nor the commander has the time to really dig into the regulation and thoroughly understand it. After all, the report is normally only emphasized once each month for a period of a few days and then is relegated to the back of the file cabinet as new requirements are addressed. Without attempting to be derogatory, I must also point out that the

report preparers at battalion level and below are combat soldiers with "dirty boots" who are not normally required to juggle data and documents with the exactness required by the current method of reporting.

3. Neglect of Current Technology

With the current influence of computers in all forms of business and government, it is difficult to believe that the Army persists in this method of transforming paper-and-pencil worksheets to 80-column punchcards and then transmitting them by AUTODIN. The technology exists to make the reporting procedure more efficient, easier to understand and faster to execute. Data bases can easily store data from the reference documents, reports and tables. A high-speed network, part of the World Wide Military Command and Control System (WWMCCS), already exists to pass the reports to the DA and JCS. All that is needed is an interactive application program to help the commander decide what ratings and supporting information his unit should report. This problem can be solved through the use of a Decision Support System.

III. DECISION SUPPORT SYSTEMS

The idea of using a computer to assist a manager, whether he is a civilian or a military officer, in reaching a decision is relatively new. Before indicating specifically how a Decision Support System (DSS) can make the battalion commander's reporting effort much easier, I would like to describe the general concept of a DSS.

Decision Support Systems define a very different view of computer technology and applications. They aim at providing access to information systems and analytic models directly to managers and challenge the assumption that computers are mainly valuable for data processing operations or the creation of standardized information systems. [Ref. 2] The idea is still relatively new and is still being developed, and, as with other areas of the computer software industry, definitions are not exact, concepts overlap, and views differ widely as to exactly what constitutes a Decision Support System. One view is that information technology advancements have led from Electronic Data Processing (EDP) to Management Information Systems (MIS) to DSS. In this view, the DSS is a continuation of MIS. A second view portrays DSS as an important subset of what MIS has been and will continue to be. Yet a third view, a

skeptical one, states that DSS is just another "buzz word" to justify new purchases from the vendors. [Ref. 3]

A. BACKGROUND

Computer-based decision support systems have been rather slow to arrive in the world of business management. The approach represents a radical departure from traditional business applications of computers. [Ref. 4]

EDP has been applied to the lower operational levels of the organization to automate the paperwork and make clerical tasks easier. Its basic characteristics include:

> emphasis on data, storage, processing and information flow at the operational level;
>
> efficient transaction processing;
>
> scheduled and optimized computer runs; and
>
> summary reports for management. [Ref. 5]

The MIS approach shifted the emphasis to the mid-level managers of the organization and employed integration and planning of the information resources. The MIS provided a wealth of information to the manager and, generally, left the interpretation of that information up to him. The characteristics of MIS include:

structured information flow;

an integration of EDP jobs by business function, such as production, marketing, personnel, etc.;

and inquiry and report generation, usually with a database and DBMS. [Ref. 6]

The development of MIS from EDP was an important step because it offered the capabilities of the computer to management. It became a method for providing information to support the operations, management and decision-making functions in the organization. [Ref. 7] However, in the view of the manager, it had some serious drawbacks:

1. It was not responsive. It was controlled by the MIS Department, which might be located in another office or even another city. It might not be available when the manager needed it.

2. It was not flexible. The reports offered to managers were structured creations of the MIS staff. Depending on the type of problem facing the manager, the MIS might be as likely to offer too much information as too little.

3. It was not adaptable. It did not permit the manager to easily alter report inputs to see what outputs would result. Rather, he would have to request the MIS staff to modify existing report formats. It was difficult for him to easily explore alternatives.

B. EMERGENCE OF DSS

The search for solutions to these and other problems with MIS has led to the development of the Decision Support System. The concept of DSS began in the late 1960s when a new technology, time-sharing, was under development. With time-sharing, a remote terminal became a means of access to computer power and permitted a literal dialogue between the system and the user. [Ref. 8] The manager now had the means to interact directly with the computer, without any middlemen. On-line access provided some significant advantages:

1. Isolated questions were answered more or less immediately, rather than tomorrow or next month. The user avoided the annoyance of interrupted concentration while waiting for the output.

2. The user could consider more alternatives. On-line access to models made it more feasible to alter them and to do a certain amount of fine tuning.

3. Debugging was easier. Errors were evident sooner and corrected quicker. On-line computation permitted applications to be developed for monitoring and controlling production processes in real-time. [Ref. 9]

This made the computer responsive to the manager's needs. He then began asking for applications packages, specifically designed for his tasks and written in a

language he could easily understand. What has resulted is a variety of new software packages for interactive use by managerial personnel. This software is centered around two broad classes of applications: data base management (information systems) and planning (modeling, analysis, etc.). [Ref. 10]

The software packages have come to be named collectively as Decision Support Systems or DSS. Formal definitions of DSS vary by author. Generally, a DSS is a computer-based system which is used personally on an ongoing basis by managers in direct support of managerial activities. [Ref. 11] It gives managers access to a variety of data, facilitates the use of analytic techniques and models, and does so in a flexible, fast response manner to permit easy repeated use of the system. [Ref. 12] It focuses on assisting managers in tasks that can not be routinized. It supports, rather than replaces, their judgement. The overall aim is to improve the effectiveness of their decision-making. [Ref. 13]

C. CATEGORIES OF DECISION-MAKING

In order to appreciate the contribution a DSS makes in assisting the manager at his job, it is necessary to understand the decision-making process from the manager's perspective. An activity common to all levels of

management, and often considered to be management itself, is decision making. [Ref. 14] It involves formulating a response to an evaluation of the present situation and a prediction of future conditions. The decision itself is the selection of an alternative response from all available alternatives. The optimum decision is the selection of the best alternative. [Ref. 15]

Depending on his relative position in the organization, the manager's main activity is either strategic planning, management control (sometimes called tactical control) or operational control. [Ref. 16]

Strategic planning is the process of deciding on objectives of the organization, on changes in these objectives, on the resources used to attain these objectives and on the politics that are to govern acquisition, use and disposition of resources. [Ref. 17] The strategic planning process typically involves high-level managers and requires innovation and creativity. It focuses on the planning required to achieve the chosen objectives. As a result, a major activity in this area is the development of predictions about the future of the organization and its environment. [Ref. 18] The complexity of the problems that arise and the nonroutine manner in which they are handled make it difficult to define specific rules for it. [Ref. 19] Within the Army's structure, strategic planners are

located in the Army Staff at the DA and at some of the major commands such as the US Army, Europe in Heidelberg, West Germany.

Management control is the process by which managers, normally at the middle levels of the organization, assure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives. [Ref. 20] There are three key issues in management control: (1) the activity involves considerable interpersonal interaction; (2) it takes place within the context of the policies and objectives developed in the strategic planning process; and (3) its paramount aim is to assure effective and efficient performance. [Ref. 21] Officers at division, brigade and battalion levels exercise management control.

Operational control is conducted at the lower levels of the organization. It is the process of assuring that specific tasks are effectively and efficiently carried out. Operational control is concerned with performing predefined activities in which the rules and procedures have been previously established. [Ref. 22] There is less judgement to be exercised in the operational control area, because the tasks, goals, and resources have been carefully delineated through the management control activity. [Ref. 23] Company commanders, platoon leaders and squad leaders exercise operational control.

There are no clear boundaries for these categories; rather, they are a continuum of the types of decisions that are made in an organization. [Ref. 24] Although the information requirements of each of these activities are quite different (see Figure 4), there are some similarities that are keys to the DSS. In each activity, the manager makes his decision by first consulting a source of information (a report, an Army Regulation, a database, The Wall Street Journal, his memory, etc.). He then applies any rules or aids he might have (standard operating procedures, detailed instructions, models, "gut feeling", etc.). He may accept the results of the rules-application or he may explore alternatives by modifying the rules or the input information, commonly known as "what if?". Eventually, by some sort of judgement process on his part, the manager reaches a decision. The degree to which the manager's source of information and rules are describable by a computer program, the more applicable a DSS is to the decision-making process.

DECISION VARIABLES	STRATEGIC PLANNING	MANAGEMENT CONTROL	OPERATIONAL CONTROL
Accuracy	low	<---------->	high
Level of detail	aggregate	<---------->	detailed
Time	future	<---------->	present
Frequency of use	infrequent	<---------->	frequent
Source	external	<---------->	internal
Scope of info	wide	<---------->	narrow
Type of info	qualitative	<---------->	quantitative
Age of info	older	<---------->	current

Figure 4. Information Characteristics [Ref. 25]

D. STRUCTURED AND UNSTRUCTURED DECISIONS

Decisions that rely on a definite procedure that has been worked out ahead of time and are repetitive and routine are known as "structured" decisions. Those which are novel, have no established methods for handling them or are elusive and highly complex are known as "unstructured" decisions. [Ref. 26] From our previous discussion of managerial activity, strategic planning requires unstructured decisions and operational control uses structured decisions. The remaining activity, management control, is known as semistructured and uses a combination of unstructured and structured decisions.

Totally structured decisions, easy to program for a computer, many times do not even need a manager. These are situations where the decision-making process is so automated that a clerk can handle it. The process of making a completely structured decision is algorithmic (logical, quantitative, unequivocal, entirely defined). All of the alternatives and the consequences of their implementation are known and defined. They may be compared and the optimal alternative easily selected. [Ref. 27]

Conversely, completely unstructured decisions, in which there are no established rules or procedures are difficult to program. The process of making an unstructured decision is heuristic. Not all variables can be identified and defined, and those that are can not always be quantified. The decision maker must resort to hypotheses, intuition, evaluations, educated guesses, experience and luck. It is a decision made under uncertainty that the alternative selected is optimal, so there is no predefined or best approach to making such a decision. [Ref. 28]

It is at the middle of the structured-unstructured continuum, the semistructured decisions, where the DSS is most effective. These are decisions where managerial judgement alone will not be adequate, perhaps because of the size of the problem or the computational complexity necessary to solve it. On the other hand, the model or data

alone is also inadequate because the solution involves some judgement and subjective analysis. Under these conditions, the manager plus the system can provide a more effective solution than either alone. [Ref. 29]

The semistructured area, the "dividing line" between structured and unstructured decisions, is shifting. Over time this line is moving more and more into the unstructured area, as we understand some of these decisions more precisely and are developing rules to make them increasingly automatic. [Ref. 30]

E. COMPONENTS OF A DSS

A DSS generally consists of three major subsystems---a database, a model base and the decision maker. Of primary importance is management of the subsystems and the interfaces between them. The database and model base are managed by software systems that work closely together to facilitate the necessary flow of data. Both are directed by a command language through a terminal that provides the mechanisms by which the decision maker gains access to both data and models and manipulates them to support his decision making. [Ref. 31] Figure 5 shows an example of how a DSS might be organized.

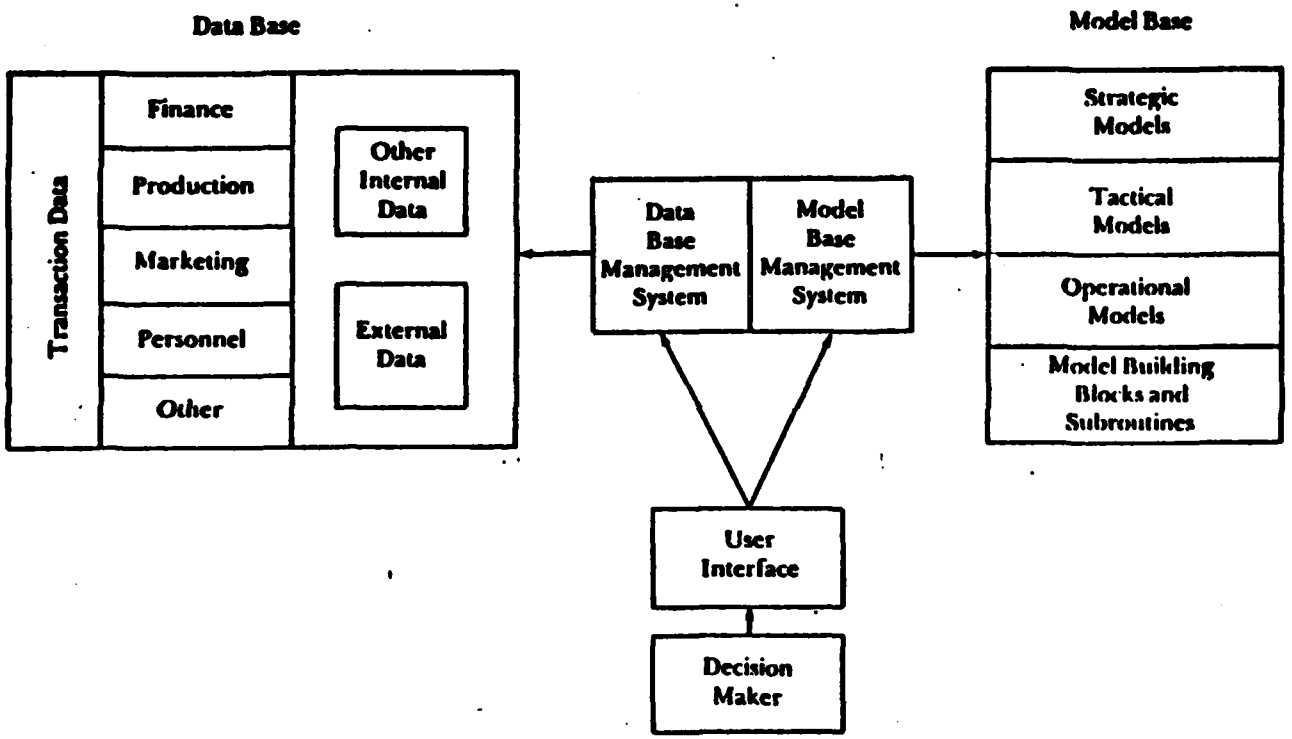

Figure 5. Components of a Decision Support System [Ref. 32]

The DATABASE SUBSYSTEM consists of the database and the software system for managing it. The capabilities of the database management system will determine the characteristics of the database itself. The database for decision support may draw data from several sources. The traditional source is the basic data processing activities of the organization, however additional sources of internal data are also required. The decision maker may need to consult estimates from other managers, engineering-related data, budgets, standards, and plans. Decision makers at upper managerial levels may need a variety of external data sources such as interest rates, economic trends and actions by other organizations. [Ref. 33]

The MODEL BASE SUBSYSTEM consists of the model base and the model base management system. The models comprising the model base subsystem may include strategic, management control and operational control models, together with model building procedures and subroutines from which other models can be constructed. Standard management models such as linear programming, multiple regression and analysis of variance are normally included. [Ref. 34]

The comprehensive set of models for decision support is a major corporate resource, just as the database is a resource. Like the database, the model base requires careful management. The functions of a model base

management system are analogous to the functions of a database management system. They may include:

1. A flexible mechanism for building or generating models.
2. A way to redefine or restructure a model in response to changes in the modeled situation.
3. A procedure for updating a model in response to a change in data.
4. Operation of the model to obtain the decision support desired. [Ref. 35]

The DECISION MAKER SUBSYSTEM consists of the terminal device, the command language and the decision maker himself. Terminal device technology has advanced rapidly in recent years. The cathode ray tube (CRT), especially when equipped with graphic and color capabilities, is an important element in aiding the decision maker in interacting with the DSS. No longer must he wait for a piece of paper from relatively slow printers. He can see the output promptly, read it clearly, and act on it immediately. The terminal device has brought computer access ("power" to the manager) from the inner sanctum of the MIS Department into his personal office.

The command language allows the decision maker to gain access to and manipulate data and models in the DSS. It must be flexible enough to accommodate a wide range of decision-making styles and powerful enough to be human

oriented instead of computer or system oriented. The command structure must be English-like to accommodate top managers lacking the knowledge or inclination to deal with computer languages, but must also accommodate staff analysts working in finer detail. [Ref. 36] However, if it is too complex or too difficult, the manager will not take the time to learn it. He will simply not use it.

All of these combine to form a DSS that can be used on a wide range of problems, drawing upon both internal and external data sources. The DSS is interactive in such a way as to allow for "what if?" questions and explore various possible alternatives. It is flexible enough to provide performance reporting on critical factors while allowing the manager to follow up and analyze. It is timely enough to make the manager feel the DSS is serving its purpose. [Ref. 37]

F. TYPES OF DSS

Decision Support Systems vary widely in terms of what they do and how they do it. DSS can best be categorized in terms of the basic operations they perform. After studying fifty-six systems, Alter [Ref. 38] divided them into seven distinct types, which he labeled as follows:

1. **FILE DRAWER SYSTEMS** are basically mechanized versions of manual filing systems. The purpose of file

drawer systems is to provide on-line access to particular data items.

2. **DATA ANALYSIS SYSTEMS** are generally used by nonmanagerial line or staff personnel in analyzing files of current or historical data.

3. **ANALYSIS INFORMATION SYSTEMS** provide management information through the use of a series of decision-oriented databases and small models.

4. **ACCOUNTING MODELS** use definitional relationships and formulas to calculate the consequences of particular actions.

5. **REPRESENTATIONAL MODELS** include all simulator models which are not primarily accounting definitions.

6. **OPTIMIZATION MODELS** are used in studying situations that can be described mathematically as complicated puzzles whose goals involve combining the pieces in a way that attains a specific objective such as maximizing profit or minimizing cost.

7. **SUGGESTION MODELS** generate suggested actions based on formulas or mathematical procedures which can range from decision rules to optimization methods.

It is this last type of DSS, the Suggestion Model, which appears most appropriate for Unit Status Reporting. It will be discussed in greater detail in Chapter IV.

G. THE COSTS AND IMPACT OF DSS

The costs and impact of DSS are hard to assess since they support managers and aim at helping to improve effectiveness. They facilitate but do not cause the improvement. Managers do that. [Ref. 39] In general, DSS can not be justified in terms of costs and benefits. The manager himself must decide. If the DSS addresses a key decision or task in which improved effectiveness is important, and is designed in terms of the manager's needs and activities, it is likely that the potential value of the system will justify the investment. If there is no perceived value, any cost will seem disproportionate. [Ref. 40]

The principal impact of many DSS is to automate clerical tasks that are performed by people who are not clerks. [Ref. 41] The result of automating the clerical component of decision-related tasks is often to improve consistency and accuracy, and to allow people to spend more of their time on the substantive, rather than the clerical aspects of their jobs. Among the best examples of DSS that increase efficiency are accounting models that consolidate plans submitted by people in various parts of a company. [Ref. 42]

DSS have also shown that they expedite problem solving. Their "fast turnaround" means that required data is obtained

more quickly than previously provided. They afford better ways to view or solve problems by providing access to information that had been previously either unavailable or available but in unusable form. [Ref. 43]

H. DSS LIMITATIONS

Although DSS can be very useful, they are not guaranteed to solve all problems under all circumstances. They do have some limitations. Among these are:

1. Types of Variables

Current DSS are most useful for manipulating tangible variables (easily perceived and measured, e.g. time, locations, dollars) both in analyzing past events and evaluating alternatives for action in the future. Capabilities with regard to intangible variables (e.g. politics, status, ethics and satisfaction) and composite variables (e.g. scenarios, chains of events, strategies and plans) are far less powerful because of problems of conceptualization, representation and measurement. [Ref. 44]

2. Types of Questions

Current DSS in business organizations can answer factual, noninferential questions (i.e., questions involving direct retrieval and aggregation of data from a database) and a rather constrained set of predictive questions (i.e., questions involving the future rather than the past) stated

in the form "Under these assumptions, what will be the outcome?" However, they can not answer factual, inferential questions (i.e., questions of fact requiring interpretation and inference on the part of the answerer) or causal, inferential questions (i.e., questions concerning causality rather than fact). This limitation is due to the common lack of an explicit model or structure for drawing inferences. It is also due in part to the current inability to insure that computer programs will apply some sort of common sense in drawing inferences correctly. [Ref. 45]

Although DSS have been very useful in many settings, there are still many decision situations in which they can not be developed to genuinely address the main issues. Frequently these are situations in which the main issues involve intangible or composite variables or in which no model exists for describing and performing the required inferences and predictions. [Ref. 46] Current research in the application of artificial intelligence concepts to decision support systems may help in reducing these limitations some day, but, currently, these issues are very formidable.

IV. THE SUGGESTION MODEL

From the seven distinct types categorized by Alter, the Suggestion Model DSS seems most appropriate for Unit Status Reporting. Alter describes the model as one which generates suggested actions based on formulas or mathematical procedures. The model is very structured, relative to the other types of DSS, and produces an output that serves as the answer to the decision makers's question. [Ref. 47]

A. RELEVANCE TO THE PROBLEM

Use of the suggestion model will help the battalion commander eliminate a great part of his clerical burden. The DSS will assure that all calculations are consistent and accurate and will relieve him of the tedium of hand calculations and the relatively error-prone method in which the report is currently prepared. It will save time and reduce aggravation for all involved in the reporting process.

B. DESIGN OF THE DSS

The basic concept for the DSS is to permit the battalion commander (or his representative) to sit at a computer terminal at the installation or division, with a piece of paper containing the month's significant figures about the

battalion. The DSS prompts him for data, calculates "suggested" ratings and permits him to adjust those ratings based on his modification of the data or by his direction (subjective change). Once the commander is satisfied with the ratings, he enters remarks, as necessary, to provide additional information for analysts and staff officers throughout the chain-of-command. Then, after all data and remarks are finalized, the system automatically furnishes the commander a printed copy of his Unit Status Report and forwards the information on his unit to the DA and the JCS.

After a terminal session that should take no more than 30 minutes, the commander can return to his unit, satisfied that the report is accurately computed, correctly formatted, properly transmitted and that it conveys the information he intended to report.

1. The Database

The database consists of a linked list of records, with one record for each unit reporting from that installation. The records are organized in Unit Identification Code (UIC) order. Each UIC, a 6-character code, uniquely identifies an active Army unit. Besides the UIC, each record also contains the following data fields:

a. MTOE number.

b. Required MTOE strength.

c. Required MTOE senior grade strength.

d. ALO

e. Number of LINs coded ERC-A.

Data for each of the fields listed above is contained in the MTOE and is easily identified.

Maintenance of the database is accomplished by an operations specialist at installation (e.g. division) level. A unit's MTOE is reviewed annually at major command level and modified, if necessary. The relatively few MTOE changes that result can easily be handled by the operations specialist. Necessity to update the database should be infrequent. No reporting unit personnel are permitted to modify the database.

With the small number (30 or less) of records to search, linked list traversal is not considered inefficient. The simple structure of a singly-linked list is easy to maintain and desirable for this application.

2. <u>The Model Base</u>

The model base contains only the model for the Unit Status Report. The model consists of routines that act on input data and access necessary reference data from the database to accomplish the computations and determine ratings in the personnel, equipment-on-hand, equipment readiness, training and overall categories. At each step of the way, the commander can modify the input data to

recompute the ratings until he is satisfied with the rating in each area and the overall rating. When he indicates that all ratings are final, the commander is prompted for the appropriate remarks to support his ratings.

The model must be changed each time the governing regulation, AR 220-1, changes. Since this happens infrequently, every three or four years or so, no model building or modifying procedures are included in the model base, although they are not difficult to create. Rather, it is envisioned that, when model modifications become necessary, the DA will transmit a fresh DSS program package to each installation to totally replace the old one.

3. The Report Writer

Although not technically a part of the DSS, the Report Writer takes all finalized data, computations, ratings and remarks and arranges them in a format prescribed by the DA to produce an easy-to-read, printed Unit Status Report. When the battalion commander receives his copy of the report, he sees it in exactly the same format that all of his superiors will see it.

4. The Command Language

The command language is very simple and user-friendly. The commander is prompted for various data, with reference paragraphs from AR 220-1 indicated, in case of confusion or the need for additional instructions. He is

also asked simple questions, requiring a "yes" or "no" answer, to indicate his desire to continue, quit, change data, etc. Every effort is made to thoroughly explain each step in plain, clear English. Because of this simplicity and the continuous references to explanatory remarks in AR 220-1, no "HELP" facility is provided, or deemed necessary.

Initializing the DSS to prepare it for service and accessing the file of data for Unit Status Report transmission to higher headquarters are both tasks of the operations specialist at installation level. Accordingly, no commands are provided in the command language of the DSS for the battalion commander to do these operations.

C. ADVANTAGES OF USE

Using a DSS to help the battalion commander report his unit's status has several advantages over the current method:

1. Speed

The DSS is much faster than the manual method. The battalion commander can expect the complete processing time to be reduced from a few days to a few hours. Except for data collection, most of the manual effort is replaced by automatic data processing.

2. Easy Computation

All computations are done by the computer and, assuming correct formulas have been programmed, there are no mathematical errors about which to be concerned. Additionally, since most data will be read from the terminal screen rather than manipulated on paper, human errors will be greatly reduced.

3. Correct Reference Data

With all important reference data, such as that listed in the MTOE, stored in the database, the commander will not suffer errors from consulting the wrong document. He will be confident that the correct data has been located and accurate computations have been made.

4. Correct Tables and Factors

As with the reference data, all tables and factors used to determine ratings are stored in the computer. Consulting the wrong table, reading the incorrect entry from a table, or using the wrong factor will no longer be a problem. Routine errors in handling data will be eliminated.

5. Exploration of Alternatives

The commander can ask "what if?" questions of the DSS by modifying his input data to see what results occur. Perhaps he will discover that his data puts him on the border between two ratings and that the worse rating results

from equipment or personnel problems that do not affect the accomplishment of his combat mission. Under the current reporting procedure, he could not easily determine this, except by chance or an extensive series of computations. With the DSS, it takes only seconds to change input data and observe the result.

6. Automatic Report Generation

Instead of having to wait hours or, at times, even days for his representative to satisfy the installation commander's group that his report is accurate, and then wait until the report is keypunched (hopefully without error), before his copy of the report is furnished to him, the commander now can receive his report within minutes of completion of the session with the DSS. He sees the same report everyone else will see about his unit and feels much more comfortable about its contents and accuracy.

7. Consistency

Of benefit not only to the battalion commander, but also to all those at higher headquarters who read or analyze the reports, is the consistency in which all reports will be produced. All units will report in the same format. All reports will be accurately computed. All reports will be complete. No longer will an analyst have to telephone the reporting unit to acquire some explanatory data that should have been in the Remarks, but was overlooked.

D. EXAMPLE OF USE

At Appendix A are two examples of battalion commanders conducting sessions with the DSS. They have each brought a list of the appropriate data with them and have a feeling as to the general combat readiness of their units. However, each realizes he has not been able to consider all of the various indicators specified in the regulation for determining his unit's status and needs the DSS to assist him in analyzing the many indicators and in determining the most accurate readiness condition to report.

In the manual method, the first session would have taken about an hour to complete. The DSS method took 3 minutes. Using the manual method for the second session would be difficult to time, since the overall time would depend greatly on the skill of the commander in searching through the instructions in the regulation for the various special entries he is required to make. Under the best of conditions, I would estimate that he would need 2 to 3 hours to complete the report properly. The DSS method took 17 minutes.

In timing the methods, I assume the commander has a list of all the raw data for the report and only needs the instructions on how to enter the data and prepare the report. For the manual method, he must search the regulation for instructions. In the DSS method, the only instruction he is provided comes from the terminal screen.

V. FUTURE CONSIDERATIONS

Although the DSS described so far is a great improvement in speed, accuracy and efficiency for completing the Unit Status Report, it can be improved even more. When the battalion commander arrives for his session with this DSS, he must bring a piece of paper containing certain data about his unit. By expanding the database of the DSS and allowing other already-existing automated report applications to share it, we can reduce the amount of data on the battalion commander's piece of paper to just a few figures.

Except for the available MOS trained strength, every item of information used to determine the Personnel Rating already exists in a database at the installation's Management Information System Office (MISO). In the case of the Equipment-On-Hand Rating, there are no exceptions. All of the data needed to determine the rating already exists at the MISO. All of this information is routinely maintained for use in other required reports.

As mentioned previously, information for determining the Equipment Readiness Rating is extracted from forms kept by the unit's maintenance personnel on a daily basis. Although the forms are currently completed manually, they could easily be automated and tied-in to the DSS database.

Assuming the automation was found to be both practical and cost-effective, the battalion commander would have all of the information necessary to determine the rating.

Since the Training Rating is so dependent on the subjective judgement of the commander, there is no reasonable way to assist him in his efforts in this area.

With a large, shared database and the additional maintenance report automation described, the commander could complete the Unit Status Report in three simple steps:

A. Enter the available MOS trained strength.

B. Enter the number of weeks to complete training.

C. Approve the ratings computed by the DSS or change any or all to reflect the commander's judgement (subjective rating).

VI. CONCLUSIONS

Time and again, Army officials have decried the enormous amounts of paperwork with which commanders must contend. Although the Unit Status Report certainly appears to be an essential reporting requirement, its preparation is complex, laborious and overly time-consuming. Current technology, in the form of a Decision Support System, offers an immediate and simple solution to the problem.

In the body of this paper, I have described the burdens imposed on the commander by the current reporting method. I have also generally described Decision Support Systems, and provided a design for a specific Decision Support System for Unit Status Reporting. In Appendix C is the source program for the DSS to meet the needs of the infantry battalion commander. The program is slightly limited in that it does not address the needs of certain units, such as medical units, special equipment units in Europe, headquarters units, and parent units (such as divisions and regiments), which have some reporting instructions peculiar to only that particular type of unit, nor does it address Reserve Compcnent units and Cadre units which report less frequently and with slightly different information. It also does not address units that have a contingency mission for NATO and

must submit an additional report with slightly modified instructions. However, the DSS does apply to the vast majority of Army units currently required to report and, with some modification for the units mentioned above, would serve the entire Army community.

The concept is not difficult to grasp and the code is not hard to write. Each Army installation already has the hardware (equivalent to an IBM-360 or better) to support the effort. Since my program is written in Pascal/VS, that compiler must be acquired or the program must be rewritten in another language---neither an expensive nor a difficult task. Although the security classification of the Unit Status Report is CONFIDENTIAL, no additional burden is placed upon the MISO staff. They already must safeguard the printer ribbon used to print the report in the current method. With the DSS method, an additional tape or disc would also have to be protected.

There are no major obstacles to the employment of a DSS in Unit Status Report reporting. It is time that the Army took advantage of current technology to modernize old-fashioned reporting procedures. The potentials for saving time and effort and for improving accuracy are enormous.

APPENDIX A: SAMPLE TERMINAL SESSIONS

Represented below are two examples of sessions in which battalion commanders use the DSS. In the first session, the battalion commander leads a unit organized at ALO 2. He has "normal" shortcomings in personnel and equipment and produces a "routine" report. In the second session, the commander has a much more unusual situation. Although his unit is also authorized at ALO 2, he has some personnel and equipment problems that greatly complicate his reporting effort. It is for this commander that the DSS will be especially helpful, since he can invoke some of the more complex DSS options to determine his overall unit status. His report is far from "routine".

For clarity, DSS prompts and instructions are shown in mixed upper-lower case letters. The battalion commanders' inputs are in upper case, only.

In each case, the battalion commander could have ultimately produced his report using the current, manual method of reporting. In neither case, however, would he have been certain that his report was accurate and complete. There is no way in the current method for him to insure that he has considered all possible steps in his decision-making process.

The Unit Status Reports for these two sessions are contained in Appendix B. They appear in the exact format the DSS produces them and forwards them to higher headquarters.

SESSION 1:

```
Welcome to the Unit Status Report
Support System.  This report is governed
by the provisions of AR 220-1.

The reporting rules will be described
as you progress thru this support system.

Enter your unit 6-character UIC below.

WAA123


Enter the 8-character MTOE number below.
Type the MTOE number exactly as it
appears on your authorization document.

44500637


Current data for MTOE 44500637:
Required Strength:          500
Senior Grade Strength:      100
Total Line Items:            60


Do you want to change the MTOE number?
Enter Y or N.

N


Do you want to change the required
strength?  Enter Y or N.

N
```

```
Do you want to change the senior grade
strength?  Enter Y or N.

N


Do you want to change the number of line
items?  Enter Y or N.

N



The unit's Authorized Level of Organiz-
ation (ALO) is filed as 2
Do you want to change the ALO?  Enter
Y or N.

N



*** Personnel Data ***

Enter the assigned strength as
defined in para 3-6a(1) of the regulation.

450


Enter the available strength as defined
in para 3-6b(1) of the regulation.

420


Enter the available MOS trained strength as
defined in para 3-6c of the regulation.

410


Enter the available senior grade strength
as defined in para 3-6d of the regulation.

90
```

Enter unit personnel turnover within the last 3 months as defined in para 3-6a of the regulation.

40

*** Percentages Computed ***

Assigned Strength Percent:	90
Available Strength Percent:	84
MOS Trained Percent:	82
Senior Grade Percent:	90
Personnel Turnover Percent:	9

Based on the percentages listed above, the personnel rating is computed to be:
C2

Would you like to recompute the personnel rating? Enter Y or N.

N

How many female soldiers are assigned to the unit? If none, enter 0.

10

How many are pregnant? If none, enter 0.

1

Enter the number of assigned off/wo/e5-e9/e1-e4, e.g. 40/12/150/400.

40/5/90/315

Enter the number of available off/wo/e5-e9/e1-e4.

35/4/90/291

*** Logistics Data ***

Enter the number of lines rated 1 as defined in para 3-7a(5) of the regulation.

50

Enter the number of lines rated 2 as defined in para 3-7a(5) of the regulation.

10

Enter the number of lines rated 3 as defined in para 3-7a(5) of the regulation.

0

Enter the number of lines rated 4 as defined in para 3-7a(5) of the regulation.

0

If your unit has a designated pacing item, enter its percent of fill below. If no pacing item has been designated, enter -1 below. See para 3-7f of the regulation for details.

95

Based on your entered data, the equipment on hand rating is computed to be:
C2

Would you like to recompute the equipment on hand rating? Enter Y or N.

N

Enter the percentage of on hand equipment mission capable as defined in para 3-8a(1) of the regulation.

92

If your unit has one or more pacing items, enter the percentage of on hand pacing items mission capable as defined in para 3-8a(2) of the regulation. If no pacing item has been designated, enter -1.

90

Enter the percentage of required equipment mission capable as defined in para 3-8b(1) of the regulation.

87

If your unit has one or more pacing items, enter the percentage of required pacing items mission capable as defined in para 3-8b(2) of the regulation. If no pacing item has been designated, enter -1.

85

Based on your entered data, the equipment readiness rating is computed to be:
C2

Would you like to recompute the equipment readiness rating? Enter Y or N.

N

*** Training Data ***

Enter the number of weeks estimated to overcome training shortfalls and attain a fully trained status as defined in para 3-9 of the regulation. Disregard that portion of the instructions prescribing an X or E entry.
Enter a number between 0 and 99.

3

Enter the relative impact that each of these factors has on maintaining training readiness. Enter A for insignificant impact, B for minor impact, C for major impact, or D for prohibitive impact.

Assigned Strength Shortfall.

B

Borrowed Military Manpower.

A

Availability of Funds.

A

Availability of Equipment/Materiel.

B

Availability of Qualified Leaders.

A

Accessibility of Training Areas/Facilities.

A

Availability of Fuel.

B

Availability of Ammunition.

A

Availability of Time.

B

Based on your entered data, the training rating is computed to be:
C2

Would you like to recompute the training rating? Enter Y or N.

N

Enter the date of your last ARTEP, e.g. 22 Apr 82.

24 Mar 82

******* Overall Rating *******

Based upon these area ratings:

Personnel----------C2
Equipment On Hand-----C2
Equipment Readiness---C2
Training----------C2

The Overall Rating is C2

The overall rating indicated above is the suggested rating for your unit. Para 3-10 of the regulation permits the commander to select a rating which best describes the unit's capability to perform its mission. The commander's selected rating may differ from the DSS-suggested rating. Do you want to change the rating from the one listed above? Enter Y or N.

N

The DSS has taken all of the data you have entered and all of the resulting computations and arranged them in the format prescribed by the regulation for the Unit Status Report. Upon completion of this session, an operations assistant will transmit your report through the proper agencies in the chain of command. To receive your own copy of the report, type 'PR FILE REPORT' (without quotes) at the terminal and the report will be sent to the line printer.

Thank you for using the Unit Status Report Decision Support System.

SESSION 2: (In this session, the battalion commander's personnal and equipment situations appear to deserve an overall rating of 4. However, unusual circumstances exist that cause him to raise the overall rating to 3. To do this properly, he must reflect the actual ratings in the resource areas and then subjectively change the overall rating. He must also justify his actions and explain his resource shortfalls, where appropriate. All of this must be done exactly in accordance with the instructions in the regulation, or the report will not be correct. It is in a situation such as this that commanders most often make mistakes and where the DSS will be of greatest assistance.)

```
Welcome to the Unit Status Report
Support System.  This report is governed
by the provisions of AR 220-1.

The reporting rules will be described
as you progress thru this support system.

Enter your unit 6-character UIC below.

WAA456


Enter the 8-character MTOE number below.
Type the MTOE number exactly as it
appears on your authorization document.

57312119


Current data for MTOE 57312119
Required Strength:          400
Senior Grade Strength:       80
Total Line Items:            40
```

Do you want to change the MTOE number?
Enter Y or N.

N

Do you want to change the required
strength? Enter Y or N.

N

Do you want to change the senior grade
strength? Enter Y or N.

N

Do you want to change the number of line
items? Enter Y or N.

N

The unit's Authorized Level of Organiz-
ation (ALO) is filed as 2
Do you want to change the ALO? Enter
Y or N.

N

*** Personnel Data ***

Enter the assigned strength as
defined in para 3-6a(1) of the regulation.

360

Enter the available strength as defined
in para 3-6b(1) of the regulation.

320

Enter the available MOS trained strength
as defined in para 3-6c of the regulation.

310

```
Enter the available senior grade strength
as defined in para 3-6d of the regulation.

51


Enter the unit personnel turnover within the
last 3 months as defined in para 3-6e of
the regulation.

30



*** Percentages Computed ***

Assigned Strength Percent:          90
Available Strength Percent:        80
MOS Trained Percent:               78
Senior Grade Percent:              64
Personnel Turnover Percent:         9


Based on the percentages listed above,
the personnel rating is computed to be:
C4


Would you like to recompute the personnel
rating?  Enter Y or N.

N


How many female soldiers are assigned to the
unit?  If none, enter 0.

0


Enter the number of assigned
off/wo/e5-e9/e1-e4, e.g. 40/12/150/400.

30/5/75/250


Enter the number of available
off/wo/e5-e9/e1-e4.

30/5/51/234
```

Please explain why the personnel rating is
below the ALO. See para 3-32d(1 thru 3) of
the regulation for assistance.
You may use up to 10 lines for your remark.
Each line may have a maximum of 60 characters
including spaces. Be brief in your remark and
use abbreviations. To indicate that
a remark is complete, enter an asterisk (*) as
the first and only symbol on a new line. Begin
your remark.

THE BATTALION IS SHORT 20 E5 11B AND 4 E6 11B FIRE
TEAM LEADERS AND SQUAD LEADERS, RESPECTIVELY. HAVE
BEEN PROMISED REPLACEMENTS FROM DIVISION WITHIN
90 DAYS. IN THE MEANTIME, AM TRAINING E4 PERSONNEL
FOR LEADERSHIP POSITIONS. TRAINING IS GOING VERY
WELL. MOST ARE NEARLY MOS QUALIFIED.
*

*** Logistics Data ***

Enter the number of lines rated 1 as
defined in para 3-7a(5) of the regulation.

35

Enter the number of lines rated 2 as
defined in para 3-7a(5) of the regulation.

0

Enter the number of lines rated 3 as
defined in para 3-7a(5) of the regulation.

0

Enter the number of lines rated 4 as
defined in para 3-7a(5) of the regulation.

5

If your unit has a designated pacing item, enter its percent of fill below. If no pacing item has been designated, enter -1 below. See para 3-7f of the regulation for details.

95

Based on your entered data, the equipment on hand rating is computed to be:
C4

Would you like to recompute the equipment on hand rating? Enter Y or N.

N

Please explain why the equipment on hand rating is below the ALO. See para 3-32d(4) of the regulation for assistance.
You may use up to 10 lines for your remark. Each line may have a maximum of 60 characters including spaces. Be brief in your remark and use abbreviations. To indicate that a remark is complete, enter an asterisk (*) as the first and only symbol on a new line. Begin your remark.

FIVE ITEMS RATED 4 ABOVE ARE TENTS OF VARIOUS SIZES. I DO NOT CONSIDER THESE ITEMS ESSENTIAL TO PERFORMANCE OF THE COMBAT MISSION. ALL ITEMS ARE ON VALID REQUISITION. EXPECTED FILL IS GREATER THAN 120 DAYS.
*

Enter the percentage of on hand equipment mission capable as defined in para 3-8a(1) of the regulation.

99

```
If your unit has one or more pacing items,
enter the percentage of on hand pacing
items mission capable as defined in
para 3-8a(2) of the regulation.  If no
pacing item has been designated, enter -1.

100


Enter the percentage of required equipment
mission capable as defined in para 3-8b(1)
of the regulation.

89


If your unit has one or more pacing items,
enter the percentage of required pacing
items mission capable as defined in
para 3-8b(2) of the regulation.  If no
pacing item has been designated, enter -1.

90


Based on your entered data, the equipment
readiness rating is computed to be:
C2


Would you like to recompute the equipment
readiness rating?  Enter Y or N.

N
```

*** Training Data ***

Enter the number of weeks estimated to overcome training shortfalls and attain a fully trained status as defined in para 3-9 of the regulation. Disregard that portion of the instructions prescribing an X or E entry. Enter a number between 0 and 99.

5

Enter the relative impact that each of these factors has on maintaining training readiness. Enter A for insignificant impact, B for minor impact, C for major impact, or D for prohibitive impact.

Assigned Strength Shortfall.

B

Borrowed Military Manpower.

B

Availability of Funds.

A

Availability of Equipment/Materiel.

A

Availability of Qualified Leaders.

C

Accessibility of Training Areas/Facilities.

A

Availability of Fuel.

B

Availability of Ammunition.

A

Availability of Time.

B

Based on your entered data, the training rating is computed to be:
C3

Would you like to recompute the training rating? Enter Y or N.

N

Enter the date of your last ARTEP, e.g. 22 Apr 82.

24 MAR 82.

Please explain why the training rating is below the ALO. See para 3-32d(7) of the regulation for assistance.
You may use up to 10 lines for your remark. Each line may have a maximum of 60 characters including spaces. Be brief in your remark and use abbreviations. To indicate that a remark is complete, enter an asterisk (*) as the first and only symbol on a new line. Begin your remark.

TRAINING IS HAMPERED BY SHORTAGE OF QUALIFIED LEADERS IN GRADES E5 AND E6. MOST VACANCIES ARE NOW BEING FILLED BY E4 PERSONNEL WHO ARE INVOLVED IN AN EXTENSIVE TRAINING PROGRAM. TRAINING PROGRAM IS VERY SUCCESSFUL AND TRAINING RATING WILL IMPROVE SHORTLY.
*

```
****** Overall Rating *******

Based upon these area ratings:

   Personnel------------C4
   Equipment On Hand----C4
   Equipment Readiness---C2
   Training-------------C3

The Overall Rating is C4


The overall rating indicated above is the
suggested rating for your unit.  Para 3-10
of the regulation permits the commander to
select a rating which best describes the
unit's capability to perform its mission.
The commander's selected rating may differ
from the DSS-suggested rating.  Do you want
to change the rating from the one listed
above?  Enter Y or N.

Y


Enter the desired overall rating.

3


Please explain why the overall rating is
below the ALO.  See para 3-31 of the
regulation for assistance.
You may use up to 10 lines for your remark.
Each line may have a maximum of 60 characters
including spaces.  Be brief in your remark and
use abbreviations.  To indicate that
a remark is complete, enter an asterisk (*) as
the first and only symbol on a new line.  Begin
your remark.

THE MAIN REASON THE OVERALL RATING IS BELOW ALO
IS THE SHORTAGE OF NCO LEADERS IN GRADES E5 AND
E6.  ONE MORE NCO WOULD HAVE QUALIFIED THE UNIT
FOR AN OVERALL RATING OF 3.  IN-HOUSE TRAINING
OF E4 PERSONNEL WILL REDUCE THE PROBLEM.  THE
SHORTAGE OF EQUIPMENT MENTIONED IN THE REPORT
IS NOT CONSIDERED SIGNIFICANT.
*
```

Please explain why you have subjectively changed the overall rating. See para 3-31 of the regulation for assistance.
You may use up to 10 lines for your remark. Each line may have a maximum of 60 characters including spaces. Be brief in your remark and use abbreviations. To indicate that a remark is complete, enter an asterisk (*) as the first and only symbol on a new line. Begin your remark.

I FEEL THE UNIT SHOULD HAVE AN OVERALL RATING OF 3 BECAUSE OF THE EXCELLENT CONDITION OF MISSION-ESSENTIAL EQUIPMENT AND THE AGGRESSIVE TRAINING PROGRAM IN EFFECT. THE PROBLEM WITH SHORTAGE OF NCO LEADERS IS SERIOUS, BUT THE FACT THAT THE PRESENCE OF ONLY ONE MORE NCO WOULD MOVE THE UNIT INTO THE 3-RATING CRITERION AND THE FACT THAT OUR TRAINING OF E4 PERSONNEL TO SHOULDER THE BURDEN IS PROVING SUCCESSFUL, GREATLY IMPROVE THE SITUATION.
*

The DSS has taken all of the data you have entered and all of the resulting computations and arranged them in the format prescribed by the regulation for the Unit Status Report. Upon completion of this session, an operations assistant will transmit your report through the proper agencies in the chain of command. To receive your own copy of the report, type 'PR FILE REPORT' (without quotes) at the terminal and the report will be sent to the line printer.

Thank you for using the Unit Status Report Decision Support System.

APPENDIX B: SAMPLE OUTPUT REPORTS

FROM SESSION 1:

UNIT STATUS REPORT

DATE: 05/20/82 TIME: 09:42:16

UIC: WAA123 MTOE: 44500637 ALO: 2

UNIT: 1st Bn, 650th Inf (MECH)

PERSONNEL READINESS DATA
- ASSIGNED: 90%
- AVAILABLE: 84%
- MOS TRAINED: 82%
- SENIOR GRADE: 90%
- TURNOVER: 9%

PERSONNEL RATING: C2

- FEMALES ASSIGNED: 10
- FEMALES PREGNANT: 1

- ASSIGNED: 40/5/90/315
- AVAILABLE: 35/4/90/291

EQUIPMENT ON HAND DATA
- TOTAL LINE ITEMS: 60
- LINES RATED 1: 50
- LINES RATED 2: 10
- LINES RATED 3: 0
- LINES RATED 4: 0

EQUIPMENT ON HAND RATING: C2

EQUIPMENT STATUS/READINESS DATA
- % OH MISSION CAPABLE: 92
- % OH PI MISSION CAPABLE: 90
- % REQ MISSION CAPABLE: 87
- % REQ PI MISSION CAPABLE: 85

EQUIPMENT READINESS RATING: C2